

INFLUENCE OF L1 PHONOLOGICAL AND ORTHOGRAPHIC SYSTEMS ON L2  
SPELLING: A CASE OF ADULT ARAB AND CHINESE ELLs AT AN INTENSIVE  
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## **Introduction**

Many learning institutions across the United States as well as other native English speaking countries such as UK, Australia and Canada, consist of a large proportion of linguistically diverse students learning to read and write in English as a second language (ESL). Second language acquisition (SLA) therefore remains a fundamental field in promoting second language (L2) literacy among different groups of non-native speakers of English. With English being accorded special status in at least 75 countries in the world with over two billion speakers (Bear et al., 2004), there is a growing demand for language literacy skills in English. More importantly, however, many of these ESL learners continue to experience difficulty in acquiring even the most basic English literacy skills and are therefore at risk for reading difficulties and school drop-out (Gottardo, 2002). Importance of literacy in our society today therefore, cannot be overemphasized as learning to read and write is the foundation of academic success (Allaith & Joshi, 2011 and Lyon, 2011). Failure to acquire proper literacy skills, including spelling, can have deleterious consequences such as loss of job opportunities, failure to get school admission, poor scores on standardized tests among others.

Graddol (1997) reports that the population of English speakers has grown tremendously, and majority of these English learners demonstrate low proficiency levels in English language literacy. For such learners to be successful in SLA basic literacy skills such as reading and writing become essential. One of the areas where such learners have had challenges is the acquisition of spelling. If learners lack sufficient word knowledge, it inhibits their reading and comprehension of text hence poor performance. Some of these learners have expressed frustration and dissatisfaction whenever they've found themselves underperforming in writing

and reading skills. Most language instructors have also had difficulties in teaching basic vocabulary and literacy to lower level language learners.

According to Cook (1997), spelling features prominently in the national curriculum in countries such as the UK and Australia. Examination boards are instructed to deduct marks for poor spelling in all subjects. In writing compositions and essay, student are often penalized for any type of spelling error be it omission or commission. Effective spelling is then an important aspect in second language learning because of its social overtones, if not other reasons. In the United States alone, some of the L1 children and adults still struggle with basic literacy such as reading and writing (National institute of Child Health and Human Development (NICHD), 2000). In 2002, the *No Child Left Behind Act* was signed into law to intervene into problems resulting to poor basic literacy by promoting reading programs used by local education agencies in the US. Literacy is therefore an essential component of success in any society where so much information is conveyed by the written word (Rayner et al., 2001).

Most L2 research studies have sought ways to identify factors either promoting or impeding effective L2 acquisition (Koda, 2005). One theory that discusses the relationship between L1 and L2 in reference to literacy acquisition is that of Developmental Interdependence Hypothesis (DIH) (Cummins, 1979). The theory suggests that, in the relationship between L1 abilities and L2 acquisition, the acquisition of L2 is mediated by the level of L1 proficiency that children have at the time they begin to acquire L2. This developmental interdependence between L1 and L2 results in a linguistic interdependence that is reflected in both written spoken language. To achieve a clear understanding of L2 literacy, wide analyses on how different L2 learners from different L1 backgrounds process word form have been done. According to Perfetti (2005), the advantage of first language literacy acquisition is that it can build on a well-

established language system that a child has acquired, with little effort, prior to literacy instruction. If a second language writing system is also involved, this presents an additional learning task. Second language learners are therefore faced with the challenge of processing information first in L1, and second, in transferring this information to L2. In the process of doing this, there exists some interference that might either be positive or negative to L2 acquisition. This study aims to explore some of the L1 influences that are evident in L2 production by ELLs.

### **Significance of the Research**

Knowledge of how ELLs acquire full word-recognition in second language is essential in designing appropriate pedagogical strategies in second language teaching and learning. Having background knowledge of how L1 orthographic and phonological systems play a role in second language spelling is the first step of benchmarking how different learners employ different strategies in second language literacy. This study tends to support the idea that, different ESL learners from different L1 backgrounds apply different strategies while processing spelling. Such strategies can be enhanced and encouraged if they promote correct spelling and also inhibited if they lead to wrong spelling. Knowledge of word-recognition in L2 facilitates text comprehension (Koda, 2005). A significant number of studies have examined core issues in word recognition such as how information in a word is perceived, extracted, sorted and retrieved (e.g. Burns & Griffin, 1998; Daneman, 1991; Daneman & Carpenter, 1980; Schmitt & Saigh, 2012) but few have paid attention to how adult L2 learners spell words in English. This study aims at exploring some of the underlying principles that influence spelling among L2 learners as well as providing pedagogical suggestions for effective L2 literacy acquisition. Previous research has demonstrated that L2 learners can correctly say words they can't spell as well as spelling words they can't say.

This has proved to be a problem to second language literacy acquisition (reading and writing) hence the need for extensive research.

The present study seeks to examine the relationship of spelling processes between two different L1 groups (Chinese and Arab) as influenced by their phonological and orthographic systems. For the sake of this study, phonological system is defined as a writing system that maps its grapheme directly to a phoneme. In other words, it's a language system whose written individual sound symbols can be distinguished and manipulated by spoken words. Some languages vary at the level of phonological processing. For instance, some have deep system e.g. English while others have shallow system e.g. Spanish or Germany. For the purpose of this study, we will focus on the latter and not the former. Languages such as Spanish and Germany have one to one grapheme-phoneme correspondences. English has proven to be complex in its grapheme-phoneme relationship. On the other hand, orthographic system is defined as a writing system that maps its grapheme to a word or a morpheme (Koda, 2008). In general, a writing system (e.g. alphabetic, syllabic or logographic) expresses the basic principle that maps graphic units onto language units. Arabic and Chinese differ in writing system designs. The Chinese writing system maps graphs (characters) onto words and morphemes or units of meaning and is thus logographic while Arabic language maps graphs onto speech sounds (phonemes) and are thus alphabetic.

### **Review of Literature**

This section first provides a detailed preview of phonological and orthographic knowledge as discussions and analyzed by various L2 studies. It is later followed by a general analysis of Arabic and Chinese language systems in terms of phonology and orthography.

Subsequently, discussions on some of the fundamental aspects in spelling acquisition among Arabic ELLs and Chinese ELLs are highlighted. This include relationship between orthography or writing system knowledge and other components of linguistic proficiency in the development of several aspects of reading skill, including comprehension, speed, and the ability to learn new vocabulary words from context. Sample findings on spelling among L1, Arabic L2 and Chinese L2 also discussed.

There exist a good amount of evidence from previous studies that phonological and orthographic skills facilitate reading development. For instance, phonemic awareness helps readers to spell and conceptualized different morphemes that do not follow regular one to one grapheme-phoneme representation. In a study involving five and six –year old children, Hulme et al. (2002) examined the predictive power of phonemic awareness on word reading performance, as compared to the larger grained phonological skills of onset and rime. Phonemic awareness, distinguished from onset-rime awareness, was measured by a deletion task. Participants were asked to remove individual sounds from non-words. Phonemic awareness, as hypothesized, emerged as the only predictor of word reading. Elsewhere, Cunningham, Perry & Stanovich (2001) examined the importance of phonological and orthographic processing in relation to reading and found that orthographic skill accounted for word recognition independent of phonological processing ability. Further evidence showed that the predictive power of orthographic processing contribute to reading made by phonological processing.

### **Role of Phonological knowledge in Spelling**

Effects of phonological process have been documented in many of the L2 studies as either promoting or limiting L2 language acquisition (Abu-Rabia, 2000; Cunningham, 1995). For



the purpose of this study, phonological processing skills are defined as the abilities to distinguish and manipulate sounds within spoken words (Castels & Coltheart, 2004). There is a general consensus in the literature that phonology plays an important role in reading and spelling. For instance, research on adult readers has accumulated a large amount of evidence demonstrating an early rapid and automatic phonological activation in visual word recognition (Wang & Geva, 2003). Research has also revealed that phonological knowledge is a crucial underlying component in reading and spelling development and pre-literate phonological knowledge measures predict early reading and spelling success (Wang & Geva, 2003). Wang et al. (2006) examined the relationship of Korean L1 and English L2 phonological and orthographic processing on reading in both languages. Results from this study supported the hypotheses that phonological processing skills in the L1 would transfer to English. Read (1986) and Treiman (1993) reported a heavy dependence on phonology in children's invented spellings and phonologically accurate misspellings; for example, pre-school children often misspell *my* as *mi*\*, and *eagle* as *egle*\*. Changes in fundamental phonological representations throughout childhood are critical to developing phonemic awareness and further accurate and efficient word reading and spelling. In this case, the children need to acquire phonological knowledge of the target language, which in turn helps build accurate and specific phonological representations.

According to Wang & Geva (2003), reading and spelling require mapping of these phonological presentations to grapheme or words in print. It is from this notion I argue that learners studying English as a second or even third language are likely to rely on the L1 or previous language while processing spelling in L2. Such reliance may help or hinder correct spelling. The development of reading depends on phonological and phonemic awareness across all languages, and languages vary in the consistency with which phonology is represented in orthography

(Ziegler & Goswami, 2005). Many theories that are linked to phonological processing have been proposed. One of these theories is the Psycholinguistic Grain Size Theory. The theory assumes that grain size along with orthographic consistency plays an important role in learning to read (Ziegler & Goswami, 2005). According to Ziegler & Goswami (2005), phonological reading becomes successful when L2 readers, or any reader, finds a shared grain size in the orthography and phonology of their language that allow a straightforward and unambiguous mapping between the two domains. The research goals in the present study were partially based on the assumption that the phonological knowledge differences that exist between L1 and L2 contribute greatly to error performance among beginning and intermediate adult ELLs.

In a recent study conducted by Allaith & Joshi (2011), the spelling performance of Arabic students on target phonemes (/p/ and /v/, /b/ and /f/, and /d/ and /t/) was compared with that of monolinguals. The study revealed that Arabic participants mostly differed from the English participants in spelling the phoneme /p/ and /b/ by substituting graphemes within the pair more often than the English counterparts did. The Arabic participants also tended to spell /v/ as /f/ and /f/ as /v/ more than the English participants did. The two studies provide us with a conclusion to predict that language systems (phonology and orthography) play a significant role in how ELLs process spelling.

### **Role of orthographic knowledge in spelling**

Varnhagen et al. (1999) define orthographic processing skills as the knowledge of conventional spellings and spelling rules. Recent cross-language and cross-orthography research suggest that visual, phonological and orthographic differences involve different demands on literacy acquisition in different languages (Wang, 2003). A large volume of literature has

documented the effects of differences in orthographic depth on learning to read and spell in different orthographies. Wang & Geva (2003), compared lexical and visual-orthographic processing in the spelling performance of 30 Cantonese Chinese ELLs to that of English monolinguals. The findings showed that Chinese ELLs had poor performance in spelling of pseudo words than L1 children. Even though spelling is an abstract and cognitive process, its actual representation in print can tell whether one knows the spelling of a given word or not. Wright and Ehri (2005), performed a study on sight word learning and memory to test how children process visual letter patterns that are not dictated by phonology, and whether their word learning is influenced by the legality of letter patterns. Their findings showed that, on a spelling posttest, the children recalled single consonant somewhat better than final doublets, and final doublets much better than initial illegal doublets. Findings in this study indicated that beginning readers use orthographic patterns to read and remember word earlier than predicted by phase theory, but their memory is constrained by their knowledge of written word structure.

The findings mentioned here provide a strong research ground to assume that phonological and orthographic skills jointly contribute to reading success.

### **Cross-Language Transfer**

Learners often transfer their L1 acquired skills over to the L2 in their attempt to process the L2 forms, whether those skills are appropriate to the L2 form system or not (Kholood & Schmitt, 2012). Most ELLs come to second language classes with L1 skills and knowledge at hand. Such skills might prove to be helpful and at the same time a hindrance to effective acquisition of L2. A good number of studies have shown that various aspects of L1 capabilities are transferred during L2 production and interpretation; (e.g. Hakuta, 1976; Hancin & Nagy,

1994; Kilborn & Ito, 1989; Sasaki, 1991, 1993), phonology (Gundel & Tarone (1983), pragmatics (e.g., Rutherford, (1983), Metalinguistic awareness (Durgunoglu, Nagy, & Hancin, (1993); Koda, 2000b and communicative strategies (e.g. Cohen, Olshtain, & Rosenstein, (1986)) as cited by Koda, (2005). Cummins (2000) contends that when one learns to read and write in his own L1, he/she is able to transfer many of those literacy skills to the L2. L1 can be a valuable classroom resource. Law and Eckes (1995) suggest that student's L1 writing provides valuable information about their L1 literacy. Most countries where English is taught as a foreign language such as Kenya, children in Kindergarten are taught using their L1 in order promote their reasoning skills as well as literacy. When they transition to upper levels such as junior school, the English language is introduced. While this is true for promoting literacy and language acquisition in L2 it also creates interference during reading and writing in L2.

### **Spelling Acquisition**

Letter-sound correspondences, phonics, spelling patterns, high frequency word recognition, decoding, word meanings, and other word attributes are the basis of written word knowledge. Often, students need hands-on practice to manipulate word features in a way that allows them to generalize beyond isolated and individual examples to entire group of words that are spelled the same way. Excelling at word recognition, spelling and vocabulary is not just a matter of memorizing isolated rules and definitions, however according to (Bear, et al., 2004) it involves engaging in meaningful reading and writing. Spelling words is a complex developmental skill that develops over time (Nassaji, 2003). Previous research has investigated how learners develop spelling skills over time (e.g. Ehri, 1980, 1987, 1989, 1992, 2000; Goswami, 1988; Treiman, 1990; Bruck and waters, 1990; Greenberg, Ehri, and Perin, 2002). Such studies have shown that children develop their spelling skills from a no-knowledge spelling

stage to a more sophisticated spelling ability. Spelling knowledge is an essential component in L2 literacy. Research has shown that students who cannot read and write are always not successful in second language learning.

In light of these findings, we can easily predict that many reading strategies developed in one language can be applied to another (Koda, 2004). Many adult ELLs come to ESL environment with a fully built in L1 language system. This system plays a major role on how ELLs construe and misconstrue spelling during word processing. Bear & et al. (2004) argue that to be fully literate is dependent on fast, accurate recognition of words in texts, and accurate production of words in writing so that readers and writers can focus their attention on making meaning. However, this has never been an easy task to most ELLs. Many L2 learners as well as English native speakers equally perform poorly on spelling. Many previous research studies have demonstrated a significant and universal cross-language phonological transfer phenomenon from various first languages (L1) to English (L2) bilingual populations (e.g. Metsala & Ehri, 1998; Ehri, 1998; Nassaji, 2007; Hakuta, 1976; Park, 2011; Wang & Geva, 2003).

While these studies focused more on L2 literacy acquisition, they reveal a significant interactions between L1 and L2. For example, a study conducted by Alperin-Sun & Wang (2011) on the influence of Spanish to reading and writing in English concluded that Spanish-speaking children who enter into the American school system after having mastered their first language (Spanish) found reading and writing in English to be difficult. Most ELLs from consistent language systems like Arabic and Spanish mostly learn sight words by forming connections between graphemes in the spellings and phonemes underlying the pronunciations of individual words (Ehri, 1998). On the other hand, English, a less consistent language, tends to have abstract and complex forms of graphemes and phonemes, hence slowing down the processing of words

and sounds by the L2 readers. Hamada & Koda (2008), also confirm in their study that orthographic properties influence word-form learning. It is also argued that the similarities and differences between learner's L1 and L2 orthographic processing experiences influence L2 word-form learning (Koda, 1997). In summary, all these studies agree on one thing in common that L1 and L2 language systems are in constant interactions during the learning process.

In Contrastive Analysis Hypothesis (CAH), Lado (1957) and Fries (1945) postulate that the structure of the first language affects the acquisition of the second language. In support of this argument, Lehn and Slager (1950) compared the segmental phonemes in Arabic and American English and found that some sources of difficulty for Arabic speakers learning English would be English /b/-/v/ contrast as seen in *habit* and *have it*. In the same study, it was also revealed that Arab ELLs have difficulties with the segmental phonemes of English because of (1) differences in the number of contrasts (2) differences in the permissible sequences, and (3) differences in the phonetic expression of similar contrasts. Based on these findings it's evident that L1 linguistic aspects significantly affect in one way or another the acquisition of L2.

The present study mainly focuses on the processing skills between two different L1 groups. The study also narrows itself to adult literacy contrary to many studies, which have focused on children. This study seeks to determine the conduit used to process spelling rather than the error product itself. According to Allaith & Joshi (2011), the absence of some consonant phonemes from Arabic has had a negative effect on its speakers when spelling of novel English phonemes. Previous research has shown that instructions that include phonological awareness are helpful for improving spelling skills because phonological skills are fundamental for correct spelling (Bourassa & Treiman, 2009).

## **Spelling Development**

In a similar study, Ehri (1999) proposed phase theory to portray children's development in learning to read words from memory by site. Ehri's phases are based on the predominant types of connections that secure sight words in memory at various points during development. The stages include, pre-alphabetic, partial alphabetic, full alphabetic and consolidated alphabetic phase. In pre-alphabetic phase readers have a little knowledge of letter names or sounds so they form connections between salient visual cues and the meaning of words to remember how to read them, for example, the two posts in bell and the clanging sound. In partial phase, readers have limited phonemic segmentation and some letter-name or- sound knowledge so they can form connections between partial letters and sounds, typically and ending letters, to remember how to read words. Full alphabetic phase readers know the major grapheme-phoneme relations, including short vowels. As a result, they can store sight word in memory by forming complete connections between graphemes and phonemes. Lastly, in consolidated phase readers have learned about multi-letter graphemes and spelling patterns of words in memory. Studies of phase theory have been interpreted by Ehri to show that when partial and full-phase readers acquire knowledge of letter – sound relations, they shift from using non-alphabetic visual features to using grapheme-phoneme connections to secure words in memory.

## **The Arabic language**

Arabic alphabet, which is also used in a number of non-Arab countries, differs significantly from the Roman alphabet. Modern Standard Arabic makes use of a six-vowel system: the short vowels /a/, /i/ and /u/ and the long vowels /a:/, /i:/ and /u:/. The longer variants are the only ones always represented in writing. The shorter variants are not; rather, they are

indicated by diacritical markings placed above the consonants that precede the vowel sound. According to Hayes-Hayib (2006), skilled Arabic readers are able to use contextual clues to fill in the missing shorter vowels because they typically represent grammatical information that can be inferred from the semantic and syntactic context and would often be redundant if presented in writing. In addition, shorter vowels make up grammatical templates that represent lexical information when filled in with consonants. Certain nouns that stem from the same root may consist of similar base root that is distinguished by vowel qualities that are inserted in the root. For instance, a templatic unit such as k-t-b, is basically filled in with vowel variants of /a/ to produce different words with different meanings such as *kitaab* (book), *kataba* (he wrote), *maktab* (office), and *maktaba* (library), (Hayes-Hayib, 2006). The three- consonant word-root system, which is the basis for most of the lexicon, is one of the most outstanding features of Arabic and other Semitic languages. For example, the verb *to study* has the root *d-r-s* in Arabic, and other related nouns, verbs and adjective such as *“teach”*, *“studious”*, *“studies”* are formed by adding different prefixes, infixes, and suffixes to the root. Context plays a significant role in vowel placement in Arabic hence the mapping of vowel sound to graphemes in English by Arabic ELLs may prove to be a challenge as a result of the incongruence that exist between English vowel inventory with that of Arabic.

Arab students studying English may find English vowel representation way different. In English, for instance, a vowel change in a word may lead to a change in meaning altogether. For example, by changing the vowel in the word *“hat”*, may lead to semantically unrelated words such as *hot*, *heat*, *hate*, or *hit*. Similarly, related differences in English words of similar consonant structures are often not semantically related (Thompson-Panos & Thomas-Ruzic,



1983). For the sake of addressing research question 1 in this study, I will highlight more on the Arabic vowel inventory. The Chinese vowel space will be highlighted in the next section.

Arabic consists of 6 vowels, three of which are considered short while the other three as long. Figure 2 represents the Arabic vowel space. It is also important to note that, Arabic vowels can be affected by neighboring segments, mainly pharyngealized sounds often referred to as emphatics, resulting in allophonic variation of such vowels. This is as a result of co-articulation effect between the vowel and the surrounding emphatics (Saadah, 2011).

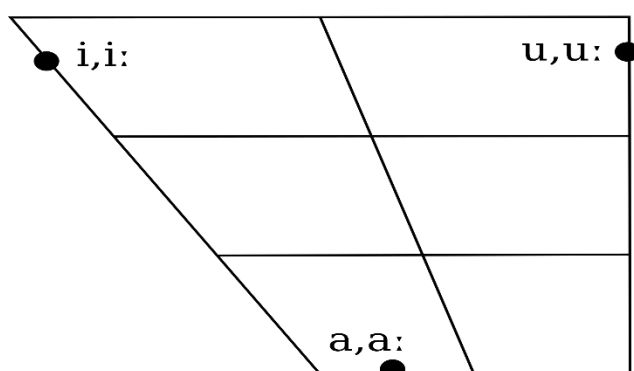


Figure 1: Schematic representaion of Arabic vowels /i, i:, u, u:, a, a:/

According to Thompson-Panos & Thomas-Ruzic (1983), recognition of letters and words, handwritten as well as printed, can be a very deliberate and time-consuming process for the Arabic speaker when decoding an unfamiliar alphabet. It is from this analysis I argue that due to difficulty encountered in decoding alphabet, Arab ELLs are more likely to use phonological route in helping them decode the spelling of words in a less familiar language such as English. It should however, be noted that while the phonological units that exist in both English and Arabic promote correct spelling in L2, the route taken reinforces such phonemes as well.

Arabic letters are also connected in both print and handwriting. Consequently, if these letters were to be deconstructed they wouldn't have any definite meaning. In addition, letters have slightly different shapes depending on where they occur in a word. Most letters have a particularly fairly distinct shape when they occur in final position. Lastly, Arabic script consists of two separate "layers" of writing. The basis root of a word is made up of the consonants and long vowels. Short vowels and other pronunciation and grammatical markers are separated from the consonant root of the word. The second layer, called vocalization is normally omitted in writing, and the reader recognizes words without it.

### **Chinese language**

Chinese is often referred to as a deep orthography (Hu & Catts, 1998). According to Geva & Wang (2003), Chinese is considered as a logographic system or a morphosyllabic system. The basic unit of the Chinese writing system is the character. Each character represents a monosyllabic morpheme and is pronounced as an open syllable. Research evidence from both adult and child studies suggest that early phonological activation is involved in Chinese word recognition (Perfetti & Tan, 1998). The phonetic information in Chinese characters is defined at the syllable level and not at the grapheme-phoneme level (Leong, 1997; Perfetti & Zhang, 1995). This means that the component that is thought to be important in reading a Chinese character maps onto a syllable, rather than onto a phoneme. Therefore, according to Leong (1997) and Perfetti et al. (2000), the Chinese writing system does not possess the segmental structure that is rudimentary to alphabetic writing systems. Research has shown that the logographic nature of the Chinese writing system, graphic information and the requisite visual skills are crucial in learning to read Chinese. Huang and Hanley (1994) did a test involving visual and paired associate learning on the Hong Kong, Taiwan and British children. The result revealed that the two were

significantly correlated with the reading performance of children in Hong Kong and Taiwan, but not with that of British children. In contrast, the reading performance of British children was better predicted by their performance on phonological awareness tasks, even after controlling for the effects of IQ and vocabulary. Leck et al. (1995), cited by Geva & Wang (2003), found out that the recognition of a Chinese integrated character relies primarily on visual information. Generally, from these findings, Geva & Wang (2003) suggested that it is possible that compared to alphabetic readers Chinese readers may draw more upon visual skills in learning to read.

Since vowel knowledge happens to be significant to the present study, the Chinese vowel inventory was also discussed.

It is apparent that Chinese and Arabic have similar vowels except that the Chinese vowels are highly associated with tone. In Chinese, tone is contrastive. For example, the word [ma] may have four different meanings that are distinguished by tone (e.g. [ma] = mother, [ma<sup>ˈ</sup>] = numb, [ma<sup>ˇ</sup>] = horse, and [ma<sup>ˋ</sup>] = scold). Figure 2 shows the vowel space inventory for Chinese language.

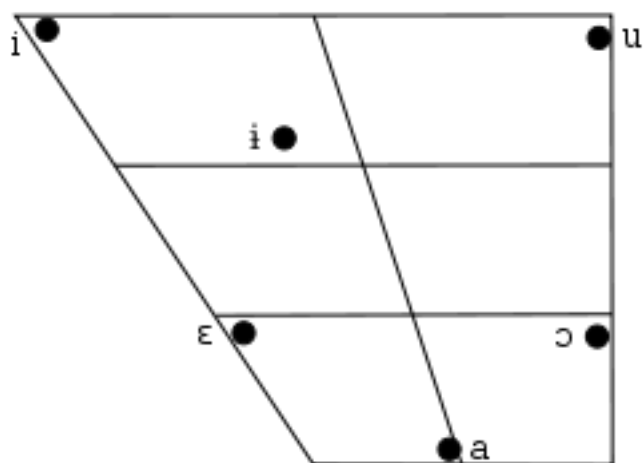


Figure 2: Chinese vowel space

From figure 1 and 2, we infer that the two language systems (Chinese and Arabic) consist of approximately similar vowel entries (e.g. /i/, /u/ and /a/) except they both consist of different supra-segmental features such as tone and vowel length. The assumption we make from these two charts is that Arabic ELLs and Chinese ELLs, with other factors kept constant, should be able to process /i/, /u/ and /a/ vowel sounds with much ease as a result of its plausibility in both languages.

### **Writing System**

Writing system generally falls into three categories: alphabetic system, syllabic system and logographic system. According to Perfetti (2003) and Perfetti et al. (2005), each writing system has a type of symbolic system used to encode linguistic information in each language, and different writing systems select different units of spoken language for mapping. Although alphabetic writing systems are structured according to the phonemic principal that graphemes represent phonemes, alphabetic writing systems differ in the variability of these mapping relations (Venezky, 1999; Ziegler & Goswami, 2005) as cited by Wright & Ehri (2005).

Alphabetic languages can be categorized along two dimensions; orthographic depth and syllabic complexity. Consistent writing systems exhibit consistent mappings between graphemes and phonemes, whereas deep orthographies contain inconsistencies (Seymour, Aro, and Erskine, 2003 cited by Wright & Ehri, 2005). Languages with transparent syllable structure such as Swahili have open consonant–vowel (CV) syllables with few consonant clusters, whereas complex languages like English have numerous closed consonant (CVC) syllables and complex consonant clusters such as CCCV as in the first syllable of the word '*chri.st.mas*'. The English writing system stands apart from other writing systems in terms of being both deep and complex. As a result, beginning readers' rate of development in English is much slower (Wright & Ehri,

2005). According to Park (2011), a syllabic writing system, consists of a letter that represents a syllable. For example Japanese Kana is a syllabic writing system in which each grapheme represents a syllable. Chinese is considered as a logographic system or simply a morphosyllabic system (Mattingly, 1992; Perfetti & Zhang, 1995).

The basic unit of Chinese writing system is the character. Research has shown that due to the logographic nature of the Chinese writing system, graphic information and the requisite visual skills are crucial in learning to read Chinese. This level of orthographic knowledge typically begins as students' transition to independent reading toward the end of first grade, and expands throughout the second and third grades, and even into the fourth grade. Syllable and affixes spelling stage is typically achieved in the intermediate level of upper elementary (Bear, et al, 2004) especially where there is great emphasis on content-area reading. Students in this stage are most often between 9-14 years, though many adults may be found in this stage. Students in this stage readily spell most one-syllable short and long –vowel words correctly. The last developmental stage is derivational relations spelling. Learners in this stage spell most words correctly. The fewer errors that they do commit have to do with using but confusing issues of consonant doubling with issues of prefix absorption.

### **Research Questions**

The goals of this study are therefore to find out whether; (1) spelling error performance among Arabic adult ELL learners is as a result of their dependence on L1 phonological knowledge, and (2) whether spelling error performance among adult Chinese ELLs is as a result of their dependence on orthographic knowledge. In connection to the same, the study seeks to address the following research questions:

- (1) Do Arab ELLs use a phonological route while processing vowel spelling in L2?  
E.g. are Arabic ELLs likely to perform better on an auditory-based test than visual based test?
- (2) Do Chinese ELLs use an orthographic route while processing word spelling in L2? E.g. does the availability of written form help Chinese ELLs perform better on spelling?

In this study, we use Cook's Standard Dual-Model (SDM) to demonstrate what we mean by 'phonological route' and 'orthographic route' as used in the above research questions. According to Cook (1997) a phonological route is a reading process that relates written letters to spoken sounds through rules for sounds-letter correspondences such as a correspondence between letter <n> and the phoneme /n/ as in the English words '*son*' and '*bent*'. On the other hand, orthographic route, also known as a visual route, is a reading process in which individual words are accessed through a lexical store without passing through phonology, as in words like '*island*' or '*through*'. In the present study we argue that Chinese ELLs whose primary language is a character –based, are likely to rely more on their visual or orthographic processing skill while processing spelling in English. On the other hand, Arab ELLs whose primary language is sound-based are likely to rely more on perception of individual phoneme while processing spelling in English.

## **Method**

### **Sample Population**

Participants in this study consisted of college students from two different L1 groups: Arab and Chinese ELLs. All the students were attending to an intensive English institute at Ball State University at the time of the study. The first group consisted of 18 native speakers of Arabic (11 males and 7 females) with an age range of 18-26. They were all from Saudi Arabia (a country in the Middle East) and reported to be speaking standard Arabic as their native language. The Chinese group consisted of 20 native speakers of Mandarin Chinese (11 males and 9 females) from China. Their age range was 18-26. Nine of them were on exchange program while 11 had come to the US to study English for academic purpose.

To be enlisted in this study, participants were to meet certain requirements. All participants were required to have a minimum of high school education at their L1- medium level institution back in their home countries as an indication that they are fluent readers in their L1. They were also required to provide demographic information relating to language background. The participants were also asked to state whether they had lived elsewhere apart from their home country before coming to the United States. All participants were selected from Level 3 and 4 of a university-affiliated program (Intensive English Program), where Level F is the lowest level of proficiency while Level 6 is the highest. Upon matriculation, participants are placed in their respective proficiency levels after taking a diagnostic test that is designed, administered and scored by the program. Based on the analysis of the questionnaire, some of the participants reported to have studied English in their home countries before coming to the US, while others reported to have been in other English programs elsewhere in the US before attending the present college. Their main reason for studying English is for academic purpose. Their average length of residency is 6.5 months.

## **Materials**

In order to analyze the spelling errors arising from phonological and orthographic spelling processes, two tasks were administered. The tasks involved (1) pseudo spelling task, and (2) error correction task. A brief questionnaire was also designed to gather participant's demographics as well as background information (see appendix 1).

The pseudo-spelling task involved 10 non-meaningful words that consisted of linguistic features targeted by the researcher (see appendix 2). The pseudo words were pre-recorded by middle-aged female native speaker of English and later presented to participants in form of an audio file. The sets of words had to meet certain specific standards: each pseudo word consisted of a regular phonemic pattern of English words except that it didn't make any sense in English. For instance, a word such as '*bake*' was changed into a pseudo word to read '*dake*'. The words consisted of mainly one syllable and excluded derivatives. The ten monosyllabic words consisted of an onset segment, nucleus segment and a coda segment.

In the error correction task, there was a set of 15 simple sentences, 12 of which consisted of one misspelled word while the other three did not have any error (see appendix 3).

### **Procedure**

Prior to the tasks, the participants were provided with a brief questionnaire form to populate in with their demographic information. The instructions for performing the tasks were written on the first page of each task. The research assistant also repeated these instructions before the beginning of every task. For each task there was a sample example provided with the equivalent response or answer. The research assistant also asked them not to look up meaning of the targeted words from mobile phones or dictionaries. Participants were also made aware that



this was not a test and they were not going to be graded. This had to take away the panic and fear of them being tested for grades.

### **Pseudo-spelling task**

In this task, participants had to listen to an audio recording of 10 pseudo-words read out loud as they write them down on a sheet of paper (see appendix 2). Before the task began, a sample practice item was read out loud and the equivalent response written out on board. This was simply to provide guidance on how the task was to be performed. Each pseudo word was only read out once. The participant's role was to write down what they heard in the answer sheets that had been provided to them. There was a time difference of 3 seconds from one item to the next. This activity lasted for approximately 3 minutes. Each pseudo word was divided into three linguistic units: onset, nucleus and coda. For example if the pseudo-word read /pæk/ for “pake”, /p/ was the onset, / æ / the nucleus, and /k/ as coda. This task only focused on the performance of nucleus. The onset and coda were only used to determine the correct form of the nucleus. Each correct form of the nucleus received one point.

### **Error correction task**

Participants were handed a list of 15 simple English sentences (see appendix 3). They were all given oral instructions at first. They were told that some sentences contained only one misspelled word while others did not have any error. They were asked to correctly identify the misspelled word by underlining it and later writing the correct form of the misspelled words in the blank provided at the end of the sentence. Thirteen of these sentences contained a misspelled word while the other two did not have any error. However, this was not revealed to the participants as it would have influenced the way they answered the questions (see appendix 3).

The target words in this tasks consisted of mainly high frequency English words that had been corrupted by either deleting one letter or replacing digraph with a different letter. For example, ‘*attract*’ was replaced with ‘*atract*’. This task was scored twice, one point for noticing the incorrect word and another point for recalling the correct form of the misspelled word.

### **Scoring**

For the sake of reliability in this study, the researcher involved two middle aged female native speakers of English (who I shall call “assistants” for the rest of this analysis) in scoring the outcome of the first two tasks. The assistants also happened to be second language instructors in an Intensive English institute. The assistants first listened to all the pseudo items and independently came up with their answers before they calibrated on the one scheme to be used in scoring all the participants in the two groups. This task was scored based on the correctness or incorrectness of the target phoneme or set of phonemes. The three assistants reached a consensus on how to score the performance of each segment. Appendix 4 indicates what raters considered as correct. All other responses other than ones included in this table were considered incorrect. The phonemes indicated in parenthesis were only considered correct if they were used with certain vowels e.g. if a student wrote “*peik*” for “*pake*” the grapheme ‘-ei-’ in the former was considered as correct, and if they wrote “*pak*”, the grapheme “-a-” was considered incorrect.

## **Results**

### **Pseudo spelling task**

Each pseudo word was divided into three segments; the onset, the nucleus and the coda. For instance, if we had the word “*poth*”, /p/ was identified as the onset, /o/ as the nucleus and /th/ as

the coda. The students were scored on performance of all the three segments. Table 1 summarizes the mean performances of the two groups on onset, nucleus and coda.

	L1 GROUP	N	M	SD	MIN	MAX
ONSET	Arabic	18	7.61	1.420	5	9
	Chinese	20	8.45	.999	7	10
	Total	38	8.05	1.272	5	10
NUCLEUS	Arabic	18	5.28	1.776	2	8
	Chinese	20	3.50	1.987	0	8
	Total	38	4.34	2.070	0	8
CODA	Arabic	18	6.00	2.223	0	10
	Chinese	20	4.95	1.638	2	8
	Total	38	5.45	1.982	0	10

Table 1. Means for word onset, nucleus and coda

### Research Question One

In order to ascertain as to whether Arabic ELLs rely on phonological route while processing spelling, we limited our analysis on the performance of both groups on the nucleus. The performance on syllable onset and coda was dropped, as it did not represent features that were plausible in both languages. Table 2 represents the mean averages and standard deviations for the nucleus (vowel) score.

L1 GROUP	N	MEAN	SD
Arab	18	5.28	1.776
Chinese	20	3.50	1.987
Av. Mean		4.34	2.07

Table 2: Mean averages and standard deviation for vowel score.

To test the research question as to whether Arabic and Chinese groups were associated with a statistically significant different mean vowel-score, an independent sample t-test was performed. The vowel-performance score was the dependent variable and the two language

groups (Chinese L1 and Arabic L1) were the independent variables. Additionally, the assumption of homogeneity of variance was tested and found tenable using Levene's F-test,  $F(36) = .151$ ,  $p = .699$ . As it can be seen in table 3, the Arabic group ( $N=18$ ) was associated with a higher vowel score mean ( $M=5.28$  ( $SD=1.78$ )). By comparison, the Chinese group ( $N=20$ ) was associated with numerically smaller vowel score mean ( $M=3.50$  ( $SD=1.99$ )). There was a significant difference in the vowel scores for Arabic L2 group ( $M=5.28$ ,  $SD=1.78$ ) and Chinese L2 group ( $M=3.50$ ,  $SD=1.99$ ). The test scores were also found to be normally distributed between the two groups. The analysis reported a statistically significant difference between the two groups  $t(36) = 2.895$ ,  $p = .006$ . The confidence interval of the difference was 95%. The main effect size for vowel score was calculated using Cohen's d formula and found to be  $\eta_p^2 = .43$ .

### **Descriptive analysis**

For the first research question, the study also used descriptive analysis to analyze the error patterns for the two groups. Figure 3 illustrate the percentage error performance for the vowels [æ], [u], [ɪ], [ɑ] and [a]. The data indicates that the Chinese group made more errors as compared to Arabic group in the phonological task. The vowel [æ] was the highest misspelled vowel by both groups at an average of 74.5%. The rest of the vowels ([u], [ɪ], [ɑ] and [a]) were rated below 20%. There was a significant difference in the spelling of phoneme /u/ (-oo-) between the two groups, with Arabic misspelling of 5.9% and Chinese misspelling of 94.1%.

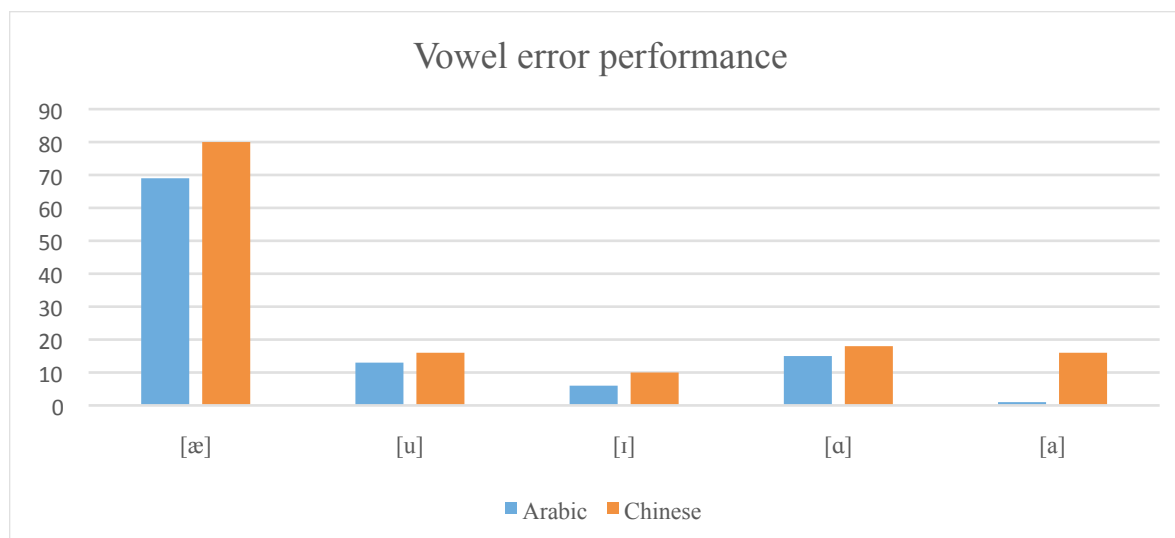


Figure 3. Bar graph of vowel performance for Arabic and Chinese groups

The error types for the two groups were also analyzed. The error performance with phoneme /æ/ and /a/ was significant. The Arab group tended to misspell phoneme /æ/ with grapheme: <ea>29.9%, <ai> 17.9%, <ee>3%, <i>1.5%, <a>35.8%, and <u>1.5% while the Chinese group misspelled the same phoneme with graphemes: <ea>24.7%, <ai>7.79%, <ee>1.3%, <i>27.3% and <a>39%. Misspelling of /æ/ with grapheme <a> did not feature in the Chinese group. The Chinese group made more errors with the high vowels [+high] i.e. /a/ and /a/ while Arabic group made more errors with grapheme <ai> and <ee>. Figure 4 summarizes the misspelling forms of /æ/ errors made by the both groups.

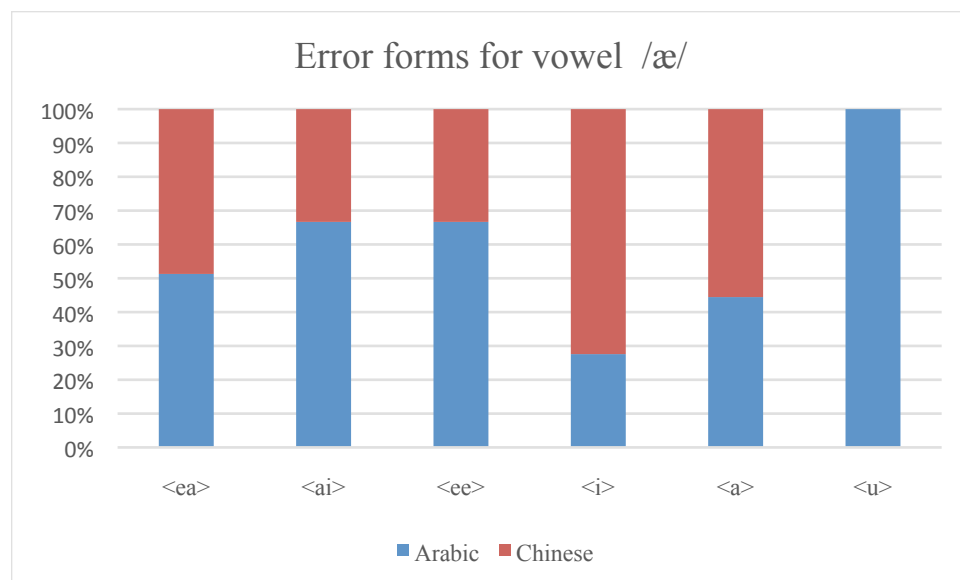


Figure 4. Error representation of phoneme /æ/

Subsequent analysis examined the misspelling patterns between the two groups. The data showed that the errors made by the two groups displayed some qualitative difference in terms of salient syllable structures and arrangement of phonemes. The Arabic group tended to spell words with a CVC syllable structure as in pseudo words; ‘*diek*’, ‘*deak*’ ‘*deek*’ and ‘*dik*’. On the other hand Chinese group tended to use rather a complex syllable structure of CVCC as in ‘*dark*’, ‘*dick*’ and even to some extent CVCCC as in ‘*dinck*’. It was also evident that the phoneme /θ/ and /p/ was poorly spelled by the Chinese and Arab group respectively. The Arab group misspelled phoneme /p/ (45%) with grapheme <b>, <t>, <k>, and <m>. For Chinese group /θ/ (65%) was misspelled with grapheme <f>, and <s>. Grapheme <f> however, constituted approximately 60% of the total errors made on the phoneme. Table 4 illustrates the qualitative data of the misspellings for 4 pseudo words used in the study.

	DAKE	THOP	ROOG	PISH
<b>ARABIC</b>	diek	thoup	roug	tech
	dek	thot	rob	pich
	deak	thuap	roag	bish
	daik	thap	ruge	besh
	deek	fab	roag	tesh
	dack	fub	roog	kish
	dik	vap	rog	-----
<b>CHINESE</b>	dark	soughe	rugle	punch
	dick	thoupe	ruck	pash
	dack	thought	rooq	peish
	dinck	fupe	ruge	cash
	deak	soup	rooge	pech
	----	-----	rude	peash

Table 3: Examples of misspellings for Chinese and Arabic ELLs

Further analyses examined the data for any existing patterns in the misspellings. In this analyses, the Arab misspelling seemed to show consistent pattern while the Chinese group displayed irregular patterns for the same type of pseudo word. Table 5 shows the misspelling pattern of 18 students picked up randomly from each group for the pseudo-word '*plake*'. We found out that Arab group was nearly consistent in misspelling the pseudo '*plake*' with '*plack*' while the Chinese group showed some variations that were inconsistent. Something also worth noting is that, both groups made fewer errors on word initial than it was on word medial and

final position. This may be attributed to the fact that onsets are more perceptually salient and clearly articulated than segments in other positions (Nsiga, 2014).

	1	2	3	4	5	6	7	8	9
<b>Arab</b>	plack	plak	plack	black	plack	plack	plack	plack	bluk
<b>Chinese</b>	plank	plaic	black	plack	plak	blick	practict	plack	plake

Table 4: Misspelling pattern for 9 randomly picked students from each group for the pseudo-word 'Plake'

### Error correction task

In order to answer the second research question as to whether Chinese students depend on orthographic route while processing spelling in L2, an analysis of error correction task was carried out. An independent sample *t*-test was performed to analyze the effect of L1 orthographic knowledge on L2 spelling between the two groups. As summarized by table 7 below, the Chinese group (N=20) was associated with a numerically higher performance on error correction scores  $M=10.75$  ( $SD=3.0$ ). The Arabic group (N=18) was associated with an error correction score  $M=7.11$  ( $SD=2.2$ ). The Leven's Test for equality of variance was performed on the distribution and found to be tenable  $F(36) = .453$ ,  $p = .505$ . The scores were also normally distributed between the two groups. The independent samples *t*-test was associated with a statistically significant effect,  $t(36) = 4.188$ ,  $p < .001$ . Thus, the Chinese group was associated with a statistically significant larger mean error correction score. The effect size was estimated use Cohen's *d* formula at 1.396.



	N	M	SD	MIN	MAX
<b>Chinese</b>	20	10.75	3.0	5	15
<b>Arabic</b>	18	7.11	2.2	3	11

Table 5: Means for Error correction task.

On further analysis, the result showed that the Arabic group had a rather lower error identification rate of 44.4% (M=6.9) with an error correction rate of 45.2% (M=.67) compared to Chinese error identification rate of 67.7% (M=10.2) with an error correction rate of 53.3 (M=9.5). The result also indicate that Chinese participant did better on spelling complex syllable structure than their Arab counterparts. Table 8 below is a sample data obtained from error correction task (see appendix3) of the word ‘meanwhile’ from 10 randomly selected participants from each L1 group. The word was intentionally misspelled as ‘\**minwhile*’. An underscore indicates that the student was not able to notice the misspelled word.

	ELL 1	ELL 2	ELL3	ELL 4	ELL 5	ELL 6	ELL 7	ELL 8	ELL 9	ELL 10
<b>Arab</b>	<i>minwhile</i>	<i>mainwhile</i>	—	<i>manwhile</i>	—	—	<i>meanwhile</i>	<i>while</i>	<i>meanwhile</i>	—
<b>Chinese</b>	<i>Meanwhil e</i>	<i>meanwhile</i>	—	<i>Meanwhil e</i>	<i>Meanwhil e</i>	<i>Meanwhil e</i>	<i>Meanwhil e</i>	<i>Meanwhil e</i>	<i>Meanwhil e</i>	<i>Minewhile</i>

Table 6: Sample data for error correction task

From data information presented in table 8, we can infer that almost 80% of the randomly selected Chinese students were able to (1) notice and (2) correct the misspelling of the word

*'meanwhile'*. On the other hand, only 10% from the Arab sample did well (Precisely, only one student out of the ten chosen candidates did well). The Arab counterparts experienced difficulty in (1) noticing and (2) correcting the misspelled word. While 50% of the Arab candidates were able to notice the misspelled word, they experienced difficulty in getting the correct spelling.

### **Discussion**

The present study explored whether or not the L1 orthographic and phonological systems affect spelling process in L2 learning. Our results confirm a strong link between L1 phonological and orthographic skills and L2 spelling, complementing previous findings on L2 literacy acquisition on spelling and reading (e.g. Wang et al., 2006; Fender, 2003; Park, 2011). The results also strengthen the claim that orthographic and phonological process plays a significant role in facilitating L2 spelling acquisition. Our primary goal was to determine whether the spelling errors performed by ELLs had any correlation with their L1 systems.

### **Research Question 1**

Comparing Arabic ELLs' error performance with Chinese error performance in both of the two tasks, we noticed a significant difference in (1) interaction and (2) type of errors performed between the two groups. Initially we had hypothesized that Arab ELLs use phonological route while processing spelling. The results seemed to support this view with Arabic group performing slightly better than Chinese group in a phonologically based task. Despite the fact that both Chinese and Arabic language system consist of /I, a, u / vowels in their respective inventories, there still existed a statistical significant difference in how they perceived and processed the vowels in the phonological based task. In the pseudo-spelling task that targeted the phonological processing skill in both language groups, the vowel sounds in

monosyllabic words emerged as one of the strongest predictors of English spelling and misspelling among the Arab group. The Arab group's spelling patterns, even for words that were misspelled, showed strong phonemic awareness knowledge than the Chinese group. The correct spelling of words such as 'PAKE', 'PLAKE', and 'ZATE' among Arab EELs supported the notion that there already exist a phonological knowledge of onset and rime. While there is debate regarding which of the phonological units (e.g., onset-rime, phoneme) best predicts reading (Sun-Alperin & Wang, 2011), our study tended to display the knowledge of both the phoneme and onset-rime awareness.

The assumption in this hypothesis was that phonological noticing is ranked higher in Arabic than orthographic noticing. An independent samples *t*-test indicated that the Arabic group made fewer errors than Chinese group in the first task. These results seem to support the prediction that different L1 groups tend to process L2 spelling differently based on their L1 phonological systems. This results confirms previous findings that argue, Arab ELLs would rely on phonological processing skills developed through their L1 literacy experience while spelling (Wade-Woolley & Geva, 2009 and Gottardo, 2001). According to Fender (2003), Arabic ELLs are likely to have significant difficulty developing fluent ESL word processing skills because phonological processing procedure may be slower and less efficient than word recognition procedure that utilize both phonological and orthographic processing skill. While Fender approaches the concept of phonological processing based on its negative influence, our study showed that it indeed helps in processing individual sounds hence correct spelling as seen our results. The pattern of spelling errors as witnessed in table 6, reflects the negative transfer of lack of phonemic knowledge in the L1 and thus difficulty in forming new phonological representations in the L2.

## Research Question 2

The second aim for this study was to determine if Chinese ELLs rely on orthographic route while processing spelling in L2. Again, our findings suggest that they do. This is supported by the high performance on error correction task from the Chinese group. On average the Chinese ELLs did better than Arab students in both identifying the wrongly spelled words as well as correcting the wrongly spelled words. Overall, the performance results from the error correction task indicate that Chinese participants have a more fluent set of orthographic recognition skills than the Arab participants. The results are generally consistent with other findings that Chinese ELLs may be more biased towards developing visual modes of processing ESL words without being hindered by extensive phonological processing procedures (Wang & Geva, 2003 and Fender, 2003). In a separate study performed by Wang & Geva (2003) to test the spelling performance of Chinese children using lexical and visual orthographic processes, it was found out that Chinese ELL children showed poorer performance in spelling of dictated pseudo words than L1 children. On the other hand, Chinese ELLs outperformed their L1 counterpart in a confrontation-spelling task of orthographically legitimate and illegitimate letter strings. These results suggest that Chinese ELLs adults may rely more on visual, holistic information and extract orthographic patterns for use in spelling, rather than utilizing a phonological strategy, a route that may be preferred by alphabetic ELLs like the Arab group.

## Conclusion

This study provides a quantitative as well as a qualitative account of how L1 phonological and orthographic system influences L2 spelling among Chinese and Arab ELLs' participants. The effects of orthographic and phonological processing skills have been examined

in the present study. The results support the hypotheses that (1) Arab ELLs are likely to use L1 phonological route while processing spelling and (2) Chinese ELLs are likely to use L1 orthographic route while processing spelling in L2. The results also reveal a strong pattern in the error performance between the two groups examined. In the error correction task the Chinese group did significantly better in using their visual cues to notice wrongly spelled words while Arab group performed relatively lower in the same task. The Arab errors were most frequented with either gaps or incomplete strings of words, a suggestion that their visual cue is not activated well enough to notice errors. On the other hand, phonologically based task (pseudo spelling task) reported some significant difference between the two groups as well. While there were some noticeable differences on the error performance of the onset and coda sounds, the difference did not yield a statistically significant result. The researcher opted to drop these scores and rather use the spelling performance of the rime. The result showed that Arabic group performed significantly better than their Chinese counterparts in spelling pseudo words using a phonological route (e.g. dictation).

Having found some evidence for the influence of L1 phonological and orthographic processing skill on spelling, we might infer some possible implications for second language acquisition. L1 is a rich learning resource that, if well harnessed, can promote effective L2 acquisition. Most of the language centers such as Intensive English Institutes across the US, use reading and writing tests as a way to determine the proficiency level of new students. The grading rubrics in such institutes place weighty emphasis on spelling errors. Spelling, as a skill is not taught explicitly however, teachers are encouraged to correct errors in the process of teaching other outcomes. Findings from this study suggest two main strategies that can be enhanced by language instructors to help second language learners from different L1 background. First, L2

learners do not process word forms all in the same way. Some ELLs, like the Chinese, may find visual strategies more useful while processing word forms in English, while other ELLs like Arab speakers may find phonological skills more useful. Second language teachers therefore must be aware of such skills and encourage them if they promote positive learning. However, instructors should also be aware of negative transfer. One way, in which L2 instructors could make use of the present knowledge, is the use of multi-route model. This is a processing model that may combine several other processing skills together (e.g. orthographic and phonological processing skills). ELLs who are able to use such models could easily access the skill when it is primed. Secondly, second language stakeholders (e.g. English programs, learning centers, L2 instructors, curriculum administrators, government agencies, schools, colleges) should promote learning materials and activities that are multivariate in approach. Since L2 learners come from different L1 backgrounds, class activities that incorporate varied spelling, and reading strategies would be essential in promoting effective L2 literacy across linguistic background. Second language acquisition is a complex process that involves, among other things, acquisition of phonemic knowledge as well orthography that might not be unary to L1. Understanding of such knowledge calls for a careful and well planned and thought out L2 instructions.

The implications of these findings, however, should be treated cautiously for what I will term as “partial analysis”. First, the pseudo-spelling task targeted only one phoneme from a set of other phonemes of a word. It should be known that a misspelling can target any part of the word like onset and rime. Therefore, this study in its entirety should not be treated as generalizable. We suggest rather an advanced study that would consider a complete analysis of plausible areas of a word where misspellings occur. Secondly, participants in this study had varied exposure to English before being admitted to the program where the study was currently

conducted. This may have affected the results in a way, bearing in mind that participants who had early exposure to English may have had an advantage over those who did not. Future studies should consider a more strict selective process that would see participants who have approximately equal English exposure. Lastly, some of the selected items in the pseudo task consisted of phonemes that were absent from L1 phonology of the two groups. This may have had an effect on the variability of the outcome since phonemes that are absent in L1 tend to be hard to process and produce among learners of low and intermediate proficiency.

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## APPENDIX 1: Background Questionnaire

- 1) What level are you in the IEI? \_\_\_\_\_
- 2) What is your first/native language? Circle your answer.
  - A. Arabic
  - B. Chinese
  - C. Other. Specify \_\_\_\_\_
- 3) What is your gender
  - A. Male
  - B. Female
  - C. Other
- 4) How old are you?  
\_\_\_\_\_ years.
- 5) Have you ever studied English before coming to the US?
  - A. Yes If yes, for how long? \_\_\_\_\_
  - B. No
- 6) Can you speak and write in your native language?
  - A. Yes
  - B. No
- 7) How long have you been in the U.S.A.? \_\_\_\_\_

## APPENDIX B: Pseudo-Spelling Task

Directions: You will hear words that are not real English words. Try your best to spell them as well as possible.

Practice item: \_\_\_\_\_ (MOG)

1. \_\_\_\_\_ (DAKE)
2. \_\_\_\_\_ (BRATE)
3. \_\_\_\_\_ (ROOG)
4. \_\_\_\_\_ (PISH)
5. \_\_\_\_\_ (PAKE)
6. \_\_\_\_\_ (THOP)
7. \_\_\_\_\_ (ZATE)
8. \_\_\_\_\_ (GAT)
9. \_\_\_\_\_ (PLACK)
10. \_\_\_\_\_ (FRAKE)

## APPENDIX 3: ERROR CORRECTION TASK

The following sentences consist of a spelling error in one of the words. Identify the error by underlining and write the correct form of the word in the blanks provided. Some sentences may not have any error. Leave such sentences blank.

For example:

Muncie is a butiful and quiet city. Beautiful

In the minwhile, we can have dinner as we wait for the movie to start. \_\_\_\_\_

My Grammar professor gives us quiz more freqntly. \_\_\_\_\_

Mike no longer visit us anmore. \_\_\_\_\_

You can't smoke anywere on this campus. \_\_\_\_\_

The Amazon River atracts tourists from all over the world. \_\_\_\_\_

Basicaly ice is water in a frozen state. \_\_\_\_\_

Sarah has shown a lot of improvemnt in her spoken English. \_\_\_\_\_

My son really hates pepperoni pizza. \_\_\_\_\_

He received a two-year scholarship to Study in the US. \_\_\_\_\_

Immediately after the car crash the victims were rushed to an emegency room. \_\_\_\_\_

The judgement of his case will be heard on Friday at 10:30AM. \_\_\_\_\_

He is one of the cadidates nominated for the best female artist of the year. \_\_\_\_\_

He was asked to finish all the paymnts before he could own the car. \_\_\_\_\_

They had a lot of struggle in getting his change of level approved. \_\_\_\_\_

Cricket sport is not familiar in the US. \_\_\_\_\_





Appendix 5: Possible graphemes considered as correct during the scoring process of pseudo spelling task

PSEUDO-WORD	Phonetic Transcription	Possible graphemes considered as correct
DAKE	[dæk]	d: d æ: -ei-, a, k: ke (k)
PRATE	[pɹæk]	pr: pr- æ: -ei-, a k: -te (t)
ROOG	[ɹuɡ]	ɹ: r- u: -oo-, ou g: -g
PISH	[pɪʃ]	p: p ɪ: i, -ea-, -ee- ʃ: -sh
PAKE	[pæk]	p: p æ: -ei-, a k: -ke, (k)
THOP	[θɑp]	θ: th- ɑ: -o-, -a- p: p
ZATE	[zæt]	z: z æ: -a-, -ei- t: -te, (t)
GAT	[ɡat]	g: g ɑ: a, u, t: -t, -rt
PLATE	[plæt]	pl: pl æ: -ei-, a t: -te, (t)